628.2
M38

628.2
M38

ALBERT F. NOYES,
City Engineer.

Learning and Labor.

LIBRARY

OF THE

University of Illinois.

CLASS. BOOK. VOLUME.

628.2 M38

Books are not to be taken from the Library.

Accession No.

ALBERT F. NOYES
City Engineer.

Digitized by the Internet Archive
in 2017 with funding from
University of Illinois Urbana-Champaign Alternates

https://archive.org/details/tablesrelatingto00mass

TABLES

Relating to

SEWERAGE.

Calculated and compiled for use during Surveys made for the

MASSACHUSETTS

DRAINAGE COMMISSION.

1885.

Elevations about Boston Harbor, referred to Boston City Base.

15.74 – Highest Spring Tide, April 1851.
15.33 – Coping of Dry Dock at Navy Yard, outer end. Point used by U.S. Coast Survey.
12.94 – Highest Spring Tide, per Tide Table.
10.44 – Mean High Water at Navy Yard.
9.94 – Neap Tide.
9.91 – Water Works Base; approximate Tide Marsh Level:
9.82 – Old South Boston Base.
8.34 – Lowest Neap Tide, per Tide Table.
5.00 – Piles under buildings usually cut off.
0.64 – Mean Low Water at Navy Yard.
0.00 – Boston City Base, Low Spring Tide.
−2.26 – Lowest Spring Tide.
−4.98 – Cambridge City Base.

M. & S. Ang. 1 to Ja. 99 Neaps 5.00

490
64
554

AMES

Tables for ascertaining the Velocity and Discharge of Sewage in Sewers.

Computed by the formula $V = c\sqrt{rs}$, in which

V = velocity, in feet per second.

c = coefficient found by experiment.

r = hydraulic radius.

s = sine of slope, = fall ÷ length.

Q = discharge, in cub. ft. per second, = V x area.

Values of c and c'.

Coefficients for CLEAN WATER (c) derived from experiments in Sudbury River Conduit.

Coefficients for SEWAGE (c') from experiments at Boston Main Drainage Works.

$c' = \frac{8c}{3}$.

$\sqrt{r}$	c	c'	$\sqrt{r}$	c	c'	$\sqrt{r}$	c	c'
0.20	85.7	76.2	0.40	101.9	90.7	0.60	112.3	99.9
.21	86.9	77.2	.41	102.6	91.2	.61	112.8	100.3
.22	88.0	78.2	.42	103.1	91.7	.62	113.2	100.7
.23	89.0	79.1	.43	103.7	92.2	.63	113.7	101.1
.24	90.0	80.0	.44	104.3	92.7	.64	114.1	101.4
.25	90.9	80.9	.45	104.8	93.2	.65	114.5	101.8
.26	91.8	81.7	.46	105.4	93.7	.66	114.9	102.2
.27	92.6	82.4	.47	105.9	94.2	.67	115.4	102.6
.28	93.5	83.1	.48	106.5	94.7	.68	115.8	102.9
.29	94.3	83.9	.49	107.0	95.2	.69	116.2	103.3
.30	95.1	84.6	.50	107.5	95.6	.70	116.6	103.7
.31	95.8	85.3	.51	108.0	96.1	.71	117.0	104.0
.32	96.6	85.9	.52	108.6	96.5	.72	117.4	104.4
.33	97.3	86.6	.53	109.0	96.9	.73	117.8	104.7
.34	98.0	87.2	.54	109.5	97.4	.74	118.1	105.0
.35	98.7	87.8	.55	110.0	97.8	.75	118.5	105.4
.36	99.4	88.4	.56	110.5	98.2	.76	118.9	105.7
.37	100.0	89.0	.57	110.9	98.6	.77	119.3	106.0
.38	100.7	89.5	.58	111.4	99.0	.78	119.6	106.3
.39	101.3	90.1	.59	111.8	99.4	.79	120.0	106.7

LIBRARY
OF THE
UNIVERSITY of ILLINOIS.

Values of c and c', continued.

$\sqrt{r}$	c	c'	$\sqrt{r}$	c	c	$\sqrt{r}$	c	c'
0.80	120.4	107.0	1.16	131.6	117.0	1.52	139.6	124.1
.81	120.7	107.3	1.17	131.9	117.2	1.53	139.8	124.2
.82	121.1	107.6	1.18	132.2	117.5	1.54	139.9	124.3
.83	121.4	107.9	1.19	132.4	117.7	1.55	140.0	124.4
.84	121.8	108.2	1.20	132.7	118.0	1.56	140.2	124.6
.85	122.1	108.6	1.21	133.0	118.2	1.57	140.3	124.7
.86	122.5	108.9	1.22	133.2	118.5	1.58	140.4	124.8
.87	122.8	109.2	1.23	133.5	118.7	1.59	140.5	124.9
.88	123.1	109.5	1.24	133.7	118.9	1.60	140.5	124.9
.89	123.5	109.8	1.25	134.0	119.1	1.61	140.6	125.0
.90	123.8	110.1	1.26	134.3	119.4	1.62	140.7	125.1
.91	124.2	110.4	1.27	134.5	119.6	1.63	140.7	125.1
.92	124.5	110.7	1.28	134.8	119.8	1.64	140.8	125.2
.93	124.8	111.0	1.29	135.0	120.0	1.65	140.8	125.2
.94	125.1	111.2	1.30	135.3	120.3	1.66	140.8	125.3
.95	125.5	111.5	1.31	135.5	120.5	1.67	140.9	125.3
.96	125.8	111.8	1.32	135.7	120.7	1.68	140.9	125.4
.97	126.1	112.1	1.33	136.0	120.9	1.69	140.9	125.4
.98	126.4	112.4	1.34	136.2	121.1	1.70	140.9	125.4
.99	126.7	112.6	1.35	136.4	121.3	1.71	140.9	125.4
1.00	127.0	112.9	1.36	136.7	121.5	1.72	140.9	125.4
1.01	127.3	113.2	1.37	136.9	121.7	1.73	141.0	125.5
1.02	127.6	113.4	1.38	137.1	121.9	1.74	141.0	125.5
1.03	127.9	113.7	1.39	137.3	122.1	1.75	141.0	125.5
1.04	128.2	114.0	1.40	137.5	122.3	1.76		125.6
1.05	128.5	114.2	1.41	137.8	122.5	1.77		125.6
1.06	128.8	114.5	1.42	138.0	122.6	1.78		125.6
1.07	129.1	114.8	1.43	138.1	122.8	1.79		125.6
1.08	129.4	115.0	1.44	138.3	123.0	1.80		125.7
1.09	129.7	115.3	1.45	138.5	123.1	1.81		125.7
1.10	129.9	115.5	1.46	138.7	123.3	1.82		125.7
1.11	130.2	115.8	1.47	138.9	123.4	1.83		125.7
1.12	130.5	116.0	1.48	139.0	123.6	1.84		125.7
1.13	130.8	116.3	1.49	139.2	123.7	1.85		125.8
1.14	131.1	116.5	1.50	139.3	123.9	1.86		125.8
1.15	131.4	116.8	1.51	139.5	124.0	1.87		125.8

LIBRARY
OF THE
UNIVERSITY of ILLINOIS.

Values of $\sqrt{s}$.

Slope 1 in :	$\sqrt{s}$	Slope 1 in :	$\sqrt{s}$	Slope 1 in :	$\sqrt{s}$	Slope 1 in :	$\sqrt{s}$	Slope 1 in :	$\sqrt{s}$	Slope 1 in :	$\sqrt{s}$
100	0.100	135	0.086	193	0.072	297	0.058	517	0.044	1110	0.030
102	.099	138	.085	198	.071	308	.057	541	.043	1190	.029
104	.098	142	.084	204	.070	319	.056	567	.042	1280	.028
106	.097	145	.083	210	.069	331	.055	595	.041	1380	.027
109	.096	149	.082	216	.068	343	.054	625	.040	1480	.026
111	.095	152	.081	223	.067	356	.053	657	.039	1600	.025
113	.094	156	.080	230	.066	370	.052	693	.038	1740	.024
116	.093	160	.079	237	.065	384	.051	730	.037	1900	.023
118	.092	164	.078	244	.064	400	.050	772	.036	2080	.022
121	.091	169	.077	252	.063	416	.049	816	.035	2280	.021
123	.090	173	.076	260	.062	434	.048	865	.034	2500	.020
126	.089	178	.075	269	.061	453	.047	918	.033	2770	.019
129	.088	183	.074	278	.060	473	.046	977	.032	3090	.018
132	.087	188	.073	287	.059	494	.045	1040	.031	3460	.017

Values of v and Q.

Note. For slopes $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$ &c. as great as any given in the following tables, values of v and Q can be found at once by dividing the corresponding tabular values by 2, 3, 4, &c.

12-inch Sewer, circular.

Depth			Slope 1:100		Slope 1:250		Slope 1:500		Slope 1:1500	
inches	Area	$\sqrt{F}$	v	Q	v	Q	v	Q	v	Q
$1\frac{1}{2}$	0.057	.28	2.33	0.13	1.47	0.08	1.03	0.06	0.60	0.03
3	0.153	.39	3.51	0.53	2.22	0.34	1.57	0.24	0.91	0.14
$4\frac{1}{2}$	0.269	.45	4.19	1.13	2.65	0.71	1.88	0.50	1.08	0.29
6	0.393	.50	4.78	1.86	3.02	1.19	2.14	0.84	1.23	0.48
$7\frac{1}{2}$	0.516	.53	5.14	2.67	3.25	1.68	2.30	1.19	1.33	0.68
9	0.632	.55	5.38	3.39	3.40	2.15	2.41	1.52	1.39	0.88
$10\frac{1}{2}$	0.729	.55	5.38	3.93	3.40	2.48	2.41	1.75	1.39	1.01
12	0.785	.50	4.78	3.73	3.02	2.37	2.14	1.68	1.23	0.97

LIBRARY
OF THE
UNIVERSITY of ILLINOIS.

15-inch Sewer Circular.

Depth inches	Area sq.ft.	√R	Slope 1:100		Slope 1:250		Slope 1:500		Slope 1:1500	
			V	Q	V	Q	V	Q	V	Q
1½	0.064	.28	2.33	0.14	1.47	0.09	1.04	0.07	0.60	0.04
3	.175	.39	3.51	.61	2.22	.39	1.57	.27	0.91	.16
4½	.310	.46	4.30	1.33	2.72	.84	1.93	.60	1.11	.34
6	.458	.52	5.02	2.31	3.16	1.45	2.25	1.03	1.30	.59
7½	.613	.56	5.51	3.36	3.47	2.13	2.46	1.51	1.42	.87
9	.769	.59	5.86	4.51	3.70	2.84	2.62	2.02	1.51	1.16
10½	.917	.61	6.12	5.63	3.86	3.54	2.74	2.52	1.58	1.45
12	1.052	.62	6.24	6.56	3.93	4.15	2.80	2.95	1.61	1.70
13½	1.163	.61	6.12	7.16	3.86	4.48	2.74	3.18	1.58	1.84
15	1.228	.56	5.51	6.78	3.47	4.25	2.46	3.02	1.42	1.74

18-inch Sewer, Circular.

Depth inches	Area sq.ft.	√R	Slope 1:100		Slope 1:250		Slope 1:500		Slope 1:1500	
			V	Q	V	Q	V	Q	V	Q
3	0.193	.39	3.51	0.67	2.22	0.43	1.57	0.30	0.91	0.18
6	.516	.53	5.14	2.67	3.25	1.67	2.30	1.18	1.33	0.68
9	.883	.61	6.12	5.39	3.87	3.42	2.74	2.42	1.58	1.40
12	1.251	.66	6.75	8.20	4.26	5.33	3.01	3.77	1.74	2.18
15	1.573	.68	7.00	11.01	4.43	6.96	3.13	4.92	1.81	2.84
18	1.767	.61	6.12	10.83	3.87	6.84	2.74	4.84	1.58	2.79

24-inch Sewer, Circular.

Depth inches	Area sq.ft.	√R	Slope 1:100		Slope 1:250		Slope 1:500		Slope 1:1500	
			V	Q	V	Q	V	Q	V	Q
3	0.227	.40	3.63	0.83	2.29	0.52	1.62	0.37	0.94	0.21
6	.614	.54	5.26	3.23	3.33	2.04	2.35	1.44	1.36	0.83
9	1.076	.64	6.49	7.01	4.10	4.42	2.90	3.12	1.68	1.80
12	1.571	.71	7.38	11.59	4.67	7.34	3.30	5.19	1.91	2.99
15	2.065	.75	7.90	16.35	5.00	10.33	3.54	7.30	2.04	4.21
18	2.527	.78	8.29	20.95	5.24	13.25	3.71	9.37	2.14	5.41
21	2.915	.78	8.29	24.16	5.24	15.29	3.71	10.81	2.14	6.24
24	3.142	.71	7.38	23.17	4.67	14.67	3.30	10.37	1.91	5.99

LIBRARY
OF THE
UNIVERSITY of ILLINOIS.

2 ft-6in. Sewer, Circular.

Depth	Area	√r	Slope 1:100		Slope 1:250		Slope 1:500		Slope 1:1500	
	sq. ft.		V	Q	V	Q	V	Q	V	Q
3"	0.255	.40	3.65	0.90	2.22	0.58	1.62	0.41	0.94	0.24
6"	0.699	.55	5.40	3.75	3.40	2.38	2.41	1.68	1.39	0.97
9"	1.238	.66	6.75	8.35	4.26	5.28	3.01	3.73	1.71	2.12
1' 0"	1.834	.73	7.65	14.00	4.84	8.86	3.42	6.28	1.97	3.62
1' 3"	2.454	.79	8.45	20.70	5.34	13.08	3.77	9.26	2.18	5.34
1' 6"	3.075	.83	8.95	27.55	5.66	17.06	4.01	12.04	2.31	7.11
1' 9"	3.670	.86	9.35	34.35	5.92	21.74	4.19	15.37	2.42	8.88
2' 0"	4.210	.87	9.50	40.00	6.00	25.36	4.25	17.93	2.45	10.33
2' 3"	4.653	.86	9.35	43.60	5.92	27.56	4.19	19.49	2.42	11.25
2' 6"	4.909	.79	8.45	41.40	5.34	26.16	3.77	18.50	2.18	10.68

3 ft. Sewer, Circular.

Depth	Area	√r	Slope 1:250		Slope 1:500		Slope 1:1500		Slope 1:2500	
	sq. ft.		V	Q	V	Q	V	Q	V	Q
3"	0.281	.40	2.30	0.64	1.62	0.46	0.94	0.26	0.73	0.20
6"	0.774	.55	3.40	2.64	2.41	1.86	1.39	1.08	1.08	0.83
9"	1.382	.66	4.26	5.92	3.01	4.18	1.71	2.40	1.35	1.86
1' 0"	2.062	.75	5.00	10.32	3.54	7.29	2.04	4.21	1.58	3.26
1' 3"	2.788	.81	5.50	15.32	3.89	10.84	2.24	6.26	1.74	4.85
1' 6"	3.534	.87	6.00	21.24	4.25	15.02	2.45	8.67	1.90	6.72
1' 9"	4.281	.91	6.36	27.20	4.49	19.23	2.59	11.10	2.01	8.60
2' 0"	5.006	.93	6.52	32.68	4.62	23.06	2.67	13.34	2.06	10.34
2' 3"	5.687	.95	6.70	38.10	4.74	26.94	2.73	15.55	2.11	12.02
2' 6"	6.294	.95	6.70	42.16	4.74	29.82	2.73	17.21	2.11	13.30
2' 9"	6.787	.94	6.62	44.86	4.67	31.73	2.70	18.32	2.09	14.19
3' 0"	7.068	.87	6.00	42.48	4.25	30.03	2.45	17.34	1.90	13.43

3 ft.- 6 in. Sewer, Circular.

Depth	Area	√r	Slope 1:250		Slope 1:500		Slope 1:1500		Slope 1:2500	
	sq. ft.		V	Q	V	Q	V	Q	V	Q
3"	0.305	.40	2.30	0.70	1.62	0.49	0.94	0.29	0.73	0.22
6"	0.843	.56	3.48	2.94	2.46	2.07	1.45	1.22	1.13	0.95
9"	1.512	.67	4.34	6.58	3.07	4.65	1.77	2.68	1.37	2.08
1' 0"	2.266	.76	5.10	11.52	3.59	8.14	2.07	4.70	1.61	3.64
1' 3"	3.085	.83	5.66	17.44	4.01	12.35	2.31	7.13	1.79	5.53

LIBRARY
OF THE
UNIVERSITY of ILLINOIS.

3 ft.-6 in. Sewer, Continued.

Depth	Area	$\sqrt{r}$	Slope 1:250		Slope 1:500		Slope 1:1500		Slope 1:2500	
	sq. ft.		v	Q	v	Q	v	Q	v	Q
1' 6"	3.938	.88	6.10	24.00	4.31	16.97	2.49	9.80	1.93	7.59
1' 9"	4.810	.94	6.62	32.20	4.67	22.76	2.70	13.15	2.09	10.18
2' 0"	5.682	.98	6.96	39.60	4.93	28.00	2.85	16.16	2.20	12.23
2' 3"	6.536	1.00	7.14	46.68	5.05	33.00	2.92	19.05	2.26	14.76
2' 6"	7.353	1.02	7.32	53.78	5.17	38.03	2.99	21.96	2.31	17.01
2' 9"	8.109	1.03	7.40	60.06	5.24	42.37	3.02	24.52	2.34	18.99
3' 0"	8.778	1.03	7.40	65.02	5.24	45.97	3.02	26.57	2.34	20.58
3' 3"	9.316	1.01	7.24	67.36	5.11	47.64	2.95	27.50	2.29	21.30
3' 6"	9.621	.94	6.62	63.60	4.67	44.97	2.70	25.97	2.09	20.11

4 ft. Sewer, Circular.

Depth	Area	$\sqrt{r}$	Slope 1:250		Slope 1:500		Slope 1:1500		Slope 1:2500	
	sq. ft.		v	Q	v	Q	v	Q	v	Q
6"	0.907	.56	3.48	3.16	2.46	2.23	1.42	1.29	1.10	1.00
1' 0"	2.457	.77	5.16	12.68	3.65	8.97	2.12	5.19	1.64	4.02
1' 6"	4.304	.90	6.26	26.98	4.43	19.07	2.56	11.05	1.99	8.57
2' 0"	6.283	1.00	7.14	44.84	5.05	31.72	2.92	18.39	2.27	14.26
2' 6"	8.262	1.06	7.68	63.42	5.43	44.84	3.14	26.00	2.44	20.17
3' 0"	10.110	1.10	8.04	80.60	5.68	56.99	3.29	33.04	2.55	25.63
3' 6"	11.660	1.10	8.04	93.70	5.68	66.25	3.29	38.42	2.55	29.81
4' 0"	12.566	1.00	7.14	89.74	5.05	63.45	2.92	36.79	2.27	28.55

4ft.-6in. Sewer, Circular.

Depth	Area	$\sqrt{r}$	Slope 1:250		Slope 1:500		Slope 1:1500		Slope 1:2500	
	sq. ft.		v	Q	v	Q	v	Q	v	Q
6"	0.966	.56	3.48	3.36	2.46	2.38	1.42	1.33	1.10	1.06
1' 0"	2.632	.77	5.16	13.58	3.65	9.61	2.12	5.56	1.64	4.32
1' 6"	4.641	.92	6.44	29.90	4.55	21.14	2.63	12.26	2.04	9.50
2' 0"	6.830	1.02	7.32	49.96	5.17	35.33	2.99	20.48	2.31	15.89
2' 6"	9.075	1.09	7.94	72.14	5.62	51.00	3.25	29.58	2.52	22.95
3' 0"	11.264	1.15	8.50	95.68	6.01	67.66	3.48	39.24	2.70	30.44
3' 6"	13.273	1.17	8.68	115.10	6.13	81.39	3.65	47.20	2.75	36.61
4' 0"	14.938	1.16	8.58	128.22	6.07	90.57	3.51	52.51	2.72	40.74
4' 6"	15.904	1.06	7.68	122.08	5.43	86.32	3.14	50.06	2.54	38.83

LIBRARY
OF THE
UNIVERSITY of ILLINOIS.

5 ft. Sewer, Circular.

Depth	Area sq.ft	$\sqrt{r}$	Slope 1 : 500		Slope 1 : 1000		Slope 1 : 2500	
			v	Q	v	Q	v	Q
6"	1.021	.56	2.46	2.51	1.74	1.78	1.11	1.14
1' 0"	2.796	.78	3.71	10.37	2.62	7.33	1.67	4.66
1' 6"	4.954	.92	4.55	22.61	3.22	15.95	2.04	10.17
2' 0"	7.335	1.03	5.24	38.41	3.70	27.16	2.36	17.28
2' 6"	9.817	1.12	5.81	57.04	4.11	40.34	2.61	25.67
3' 0"	12.300	1.18	6.20	76.27	4.38	53.93	2.79	34.33
3' 6"	14.681	1.22	6.47	94.92	4.57	67.12	2.91	42.72
4' 0"	16.839	1.24	6.59	111.03	4.66	78.51	2.96	49.96
4' 6"	18.613	1.22	6.47	120.34	4.57	85.10	2.91	56.16
5' 0"	19.635	1.12	5.81	114.06	4.11	80.65	2.60	51.33

6ft. Sewer, Circular.

Depth	Area.sq.ft.	$\sqrt{r}$	Slope 1 : 500		Slope 1 : 1000		Slope 1 : 2500	
			v	Q	v	Q	v	Q
6"	1.126	.57	2.51	2.83	1.78	2.01	1.12	1.27
1' 0"	3.097	.78	3.71	11.49	2.62	8.12	1.66	5.14
1' 6"	5.528	.94	4.67	25.84	3.31	18.27	2.09	11.56
2' 0"	8.250	1.06	5.43	44.78	3.84	31.66	2.43	20.03
2' 6"	11.151	1.15	6.01	66.98	4.25	47.37	2.69	29.96
3' 0"	14.137	1.23	6.53	92.30	4.62	65.42	2.92	41.28
3' 6"	17.123	1.28	6.86	117.43	4.85	83.04	3.07	52.52
4' 0"	20.024	1.32	7.12	142.67	5.04	100.89	3.19	63.81
4' 6"	22.747	1.35	7.32	166.58	5.18	117.79	3.28	74,50
5' 0"	25.177	1.35	7.32	184.18	5.18	130.38	3.28	82.46
5' 6"	27.149	1.33	7.19	195.23	5.08	138.05	3.22	87.31
6' 0"	28.274	1.23	6.53	184.61	4.62	130.46	2.92	82.56

7 ft. Sewer, Circular.

Depth	Area.sq.ft.	$\sqrt{r}$	Slope 1: 500		Slope 1: 1000		Slope 1: 2500	
			v	Q	v	Q	v	Q
6"	1.220	.57	2.51	3.07	1.78	2.17	1.12	1.37
1' 0"	3.372	.79	3.77	12.71	2.67	8.99	1.69	5.69
1' 6"	6.047	.95	4.74	28 64	3.35	20.25	2.12	12.81
2' 0"	9.074	1.07	5.49	49.85	3.88	35.25	2.46	22.29
2' 6"	12.339	1.17	6.13	75.67	4.34	53.51	2.74	33.84

LIBRARY
OF THE
UNIVERSITY of ILLINOIS.

7 ft. Sewer, continued:

Depth	Area sq.ft	$\sqrt{r}$	Slope 1 : 500		Slope 1 : 1000		Slope 1 : 2500	
			v	Q	v	Q	v	Q
3' 0"	15.754	1.26	6.73	106.00	4.76	74.95	3.01	47.40
3' 6"	19.242	1.32	7.12	137.10	5.04	96.95	3.19	61.31
4' 0"	22.730	1.38	7.52	171.00	5.32	120.92	3.36	76.47
4' 6"	26.145	1.42	7.79	203.56	5.52	143.94	3.48	91.03
5' 0"	29.411	1.45	7.98	234.77	5.64	166.01	3.57	105.00
5' 6"	32.438	1.46	8.05	261.14	5.69	184.66	3.60	116.80
6' 0"	35.112	1.46	8.05	282.67	5.69	199.88	3.60	126.40
6' 6"	37.264	1.43	7.85	292.64	5.55	206.93	3.51	130.90
7' 0"	38.484	1.32	7.12	274.21	5.04	193.90	3.19	122.60

9 ft. Sewer, Circular.

Depth	Area sq.ft	$\sqrt{r}$	Slope 1 : 500		Slope 1 : 1000		Slope 1 : 2500	
			v	Q	v	Q	v	Q
6"	1.391	.57	2.51	3.50	1.78	2.47	1.12	1.58
1' 0"	3.864	.79	3.77	14.57	2.67	10.30	1.69	6.58
1' 6"	6.969	.96	4.80	33.45	3.39	23.66	2.16	16.55
2' 0"	10.527	1.09	5.62	59.16	3.97	41.84	2.53	26.62
2' 6"	14.420	1.20	6.33	91.32	4.48	64.57	2.84	41.09
3' 0"	18.563	1.29	6.92	128.51	4.90	90.87	3.11	57.82
3' 6"	22.882	1.37	7.46	171.01	5.27	120.65	3.36	76.95
4' 0"	27.318	1.44	7.92	216.39	5.60	153.01	3.56	97.37
4' 6"	31.809	1.50	8.31	264.36	5.88	186.94	3.73	118.96
5' 0"	36.299	1.55	8.62	313.01	6.10	221.33	3.88	140.85
5' 6"	40.735	1.59	8.88	361.77	6.28	255.82	4.00	162.79
6' 0"	45.054	1.62	9.06	408.34	6.41	288.74	4.08	183.75
6' 6"	49.197	1.64	9.18	451.75	6.49	319.44	4.13	203.28
7' 0"	53.091	1.65	9.24	490.48	6.53	346.83	4.16	220.72
7' 6"	56.648	1.65	9.24	523.34	6.53	370.06	4.16	235.50
8' 0"	59.753	1.64	9.18	548.68	6.49	387.98	4.13	246.91
8' 6"	62.226	1.61	9.00	560.05	6.37	395.02	4.05	252.02
9' 0"	63.617	1.50	8.31	528.75	5.88	373.89	3.73	237.93

OF THE
UNIVERSITY of ILLINOIS.

2 ft. x 3ft. Sewer, Egg-shaped.

Depth	Area	$\sqrt{r}$	Slope 1:100		Slope 1:250		Slope 1:500		Slope 1:1500	
ft.	sq.ft.		V	Q	V	Q	V	Q	V	Q
0.1	0.041	.25	2.02	0.09	1.4	0.06	0.9	0.04	0.52	0.02
.2	.112	.35	3.14	0.34	2.0	0.22	1.4	0.15	0.81	0.09
.3	.199	.41	3.81	0.76	2.4	0.46	1.7	0.34	0.99	0.20
.4	.299	.46	4.26	1.28	2.8	0.82	1.9	0.57	1.10	0.34
.5	.413	.50	4.70	1.97	3.0	1.24	2.1	0.88	1.21	0.51
.6	.538	.53	5.15	2.76	3.2	1.74	2.3	1.23	1.33	0.71
.7	.674	.57	5.60	3.78	3.6	2.40	2.5	1.69	1.45	0.97
.8	.818	.59	5.82	4.81	3.8	3.04	2.6	2.15	1.50	1.24
.9	.972	.62	6.27	6.07	4.0	3.84	2.8	2.71	1.62	1.56
1.0	1.133	.64	6.49	7.36	4.0	4.66	2.9	3.29	1.68	1.90
1.1	1.301	.66	6.72	8.80	4.2	5.56	3.0	3.93	1.74	2.27
1.2	1.476	.68	6.94	10.32	4.4	6.52	3.1	4.61	1.79	2.66
1.3	1.656	.70	7.16	12.02	4.6	7.60	3.2	5.37	1.85	3.11
1.4	1.841	.72	7.39	13.91	4.8	8.72	3.3	6.17	1.91	3.57
1.5	2.030	.73	7.61	15.51	4.8	9.80	3.4	6.93	1.97	4.01
1.6	2.223	.75	7.84	17.42	5.0	11.20	3.5	7.80	2.03	4.52
1.7	2.418	.76	8.06	19.48	5.0	12.20	3.6	8.70	2.08	5.04
1.8	2.616	.77	8.28	21.28	5.2	13.60	3.7	9.50	2.14	5.51
1.9	2.814	.78	8.28	23.29	5.2	14.80	3.7	10.40	2.14	6.03
2.0	3.014	.79	8.51	25.53	5.4	16.00	3.8	11.40	2.20	6.51
2.1	3.214	.80	8.51	27.55	5.4	17.40	3.8	12.30	2.20	7.13
2.2	3.412	.81	8.73	29.79	5.6	18.80	3.9	13.30	2.26	7.81
2.3	3.605	.82	8.73	31.84	5.6	20.20	3.9	14.20	2.26	8.33
2.4	3.792	.821	8.96	33.60	5.6	21.20	4.0	15.00	2.32	8.70
2.5	3.971	.825	8.96	35.39	5.6	22.40	4.0	15.80	2.32	9.16
2.6	4.138	.823	8.96	36.73	5.6	23.20	4.0	16.40	2.32	9.51
2.7	4.290	.82	8.73	37.85	5.6	24.00	3.9	16.90	2.26	9.80
2.8	4.422	.82	8.73	38.75	5.6	24.40	3.9	17.30	2.26	10.03
2.9	4.526	.80	8.51	38.97	5.4	24.60	3.8	17.40	2.20	10.09
3.0	4.585	.76	8.06	36.73	5.0	23.20	3.6	16.40	2.08	9.51

LIBRARY
OF THE
UNIVERSITY of ILLINOIS.

2ft.4in. x 3ft.6in. Sewer, Egg-shaped.

Depth	Area	√F	Slope 1:100		Slope 1:250		Slope 1:500		Slope 1:1500	
ft.	sq.ft		v	Q	v	Q	v	Q	v	Q
0.1	.045	.25	2.01	0.09	1.28	0.06	0.90	0.04	0.52	0.02
.2	.122	.35	3.06	0.33	1.94	0.24	1.37	0.15	0.79	0.09
.3	.217	.42	3.84	0.82	2.44	0.52	1.72	0.37	1.00	0.21
.4	.325	.47	4.43	1.43	2.80	0.92	1.98	0.64	1.14	0.37
.5	.447	.51	4.92	2.19	3.10	1.38	2.20	0.98	1.27	0.56
.6	.582	.54	5.26	3.06	3.32	1.94	2.35	1.37	1.35	0.79
.7	.727	.57	5.62	4.07	3.56	2.58	2.51	1.82	1.45	1.05
.8	.883	.60	6.00	5.30	3.78	3.34	2.68	2.37	1.55	1.36
.9	1.049	.63	6.38	6.69	4.02	4.44	2.85	2.99	1.64	1.72
1.0	1.224	.66	6.74	8.26	4.26	5.22	3.01	3.69	1.74	2.13
1.1	1.407	.68	7.00	9.85	4.42	6.22	3.13	4.40	1.81	2.55
1.2	1.598	.70	7.27	11.62	4.60	7.34	3.25	5.19	1.88	3.00
1.3	1.796	.71	7.39	13.25	4.66	8.38	3.30	5.92	1.91	3.43
1.4	2.000	.73	7.65	15.31	4.84	9.66	3.42	6.84	1.98	3.96
1.5	2.210	.75	7.92	17.49	5.00	11.04	3.54	7.81	2.05	4.52
1.6	2.424	.77	8.17	19.82	5.18	12.52	3.65	8.85	2.11	5.12
1.7	2.643	.78	8.30	21.85	5.24	13.86	3.71	9.80	2.14	5.68
1.8	2.866	.80	8.55	25.56	5.42	15.52	3.83	10.97	2.22	6.35
1.9	3.091	.81	8.70	26.88	5.50	17.00	3.89	12.00	2.25	6.96
2.0	3.320	.82	8.84	29.34	5.58	18.52	3.95	13.10	2.28	7.59
2.1	3.550	.83	8.98	31.84	5.66	20.10	4.01	14.22	2.32	8.14
2.2	3.782	.84	9.09	34.20	5.76	21.74	4.06	15.27	2.35	8.85
2.3	4.014	.85	9.24	37.11	5.84	23.44	4.13	16.57	2.39	9.60
2.4	4.246	.86	9.37	39.82	5.92	25.16	4.19	17.78	2.42	10.31
2.5	4.477	.87	9.52	42.60	6.00	26.90	4.25	19.02	2.46	11.03
2.6	4.705	.88	9.65	45.42	6.10	28.68	4.31	20.28	2.49	11.76
2.7	4.928	.88	9.65	47.56	6.10	30.04	4.31	21.24	2.49	12.21
2.8	5.145	.89	9.78	50.34	6.18	31.80	4.37	22.48	2.52	13.03
2.9	5.353	.89	9.78	52.38	6.18	33.08	4.37	23.39	2.52	13.56
3.0	5.550	.89	9.78	54.32	6.18	34.30	4.37	24.25	2.52	14.06
3.1	5.735	.89	9.78	56.13	6.18	35.44	4.37	25.06	2.52	14.53
3.2	5.902	.88	9.65	56.82	6.10	35.96	4.31	25.37	2.49	14.70
3.3	6.047	.88	9.65	58.37	6.10	36.86	4.31	25.06	2.49	15.11
3.4	6.161	.86	9.37	57.79	5.92	36.50	4.19	25.80	2.42	14.96
3.5	6.225	.82	8.84	55.01	5.58	34.74	3.95	24.56	2.28	14.24

LIBRARY
OF THE
UNIVERSITY of ILLINOIS.

2ft. 8 in. x 4ft. Sewer, Egg-shaped.

Depth	Area	√F	Slope 1:250		Slope 1:500		Slope 1:1500		Slope 1:2500	
ft.	sq. ft.		V	Q	V	Q	V	Q	V	Q
0.1	.048	.25	1.28	0.06	0.90	0.04	0.52	0.02	0.41	0.02
.2	.131	.35	1.94	0.26	1.37	0.18	0.79	0.10	0.61	0.08
.3	.235	.42	2.44	0.58	1.72	0.40	0.99	0.23	0.77	0.18
.4	.353	.47	2.80	0.98	1.98	0.70	1.14	0.40	0.89	0.32
.5	.484	.52	3.22	1.56	2.24	1.09	1.29	0.63	1.01	0.49
.6	.628	.55	3.40	2.14	2.41	1.51	1.39	0.87	1.08	0.68
.7	.784	.59	3.70	2.90	2.62	2.06	1.51	1.19	1.18	0.93
.8	.952	.62	3.94	3.76	2.79	2.66	1.61	1.54	1.26	1.20
.9	1.130	.64	4.12	4.64	2.90	3.28	1.68	1.90	1.31	1.48
1.0	1.318	.67	4.34	5.74	3.07	4.05	1.77	2.34	1.38	1.82
1.1	1.515	.69	4.50	6.84	3.19	4.82	1.84	2.79	1.44	2.17
1.2	1.721	.71	4.66	8.04	3.30	5.68	1.91	3.29	1.49	2.56
1.3	1.934	.73	4.84	9.34	3.42	6.61	1.98	3.82	1.54	2.97
1.4	2.155	.75	5.00	10.92	3.54	7.62	2.05	4.41	1.59	3.43
1.5	2.383	.77	5.16	12.30	3.65	8.70	2.11	5.05	1.65	3.92
1.6	2.617	.79	5.34	13.96	3.77	9.87	2.18	5.71	1.69	4.45
1.7	2.856	.80	5.42	15.46	3.83	11.19	2.21	6.48	1.73	5.00
1.8	3.101	.82	5.58	17.30	3.95	12.24	2.28	7.09	1.77	5.51
1.9	3.350	.83	5.66	18.98	4.01	13.42	2.32	7.78	1.80	6.04
2.0	3.602	.85	5.84	21.02	4.13	14.86	2.40	8.61	1.86	6.69
2.1	3.858	.86	5.92	22.86	4.19	16.16	2.43	9.37	1.89	7.28
2.2	4.116	.87	6.00	24.74	4.25	17.49	2.46	10.13	1.91	7.88
2.3	4.377	.88	6.10	26.68	4.31	18.86	2.49	10.93	1.94	8.49
2.4	4.648	.89	6.18	28.68	4.37	20.28	2.53	11.74	1.97	9.13
2.5	4.905	.90	6.26	30.74	4.43	21.74	2.56	12.60	1.99	9.79
2.6	5.170	.91	6.36	32.84	4.49	23.23	2.59	13.46	2.02	10.45
2.7	5.435	.92	6.44	35.00	4.55	24.75	2.63	14.35	2.04	11.14
2.8	5.699	.93	6.52	37.20	4.62	26.31	2.67	15.25	2.08	11.84
2.9	5.962	.93	6.52	38.92	4.62	27.52	2.67	15.96	2.08	12.38
3.0	6.222	.94	6.62	41.14	4.67	29.09	2.70	16.86	2.10	13.09
3.1	6.477	.94	6.62	42.82	4.67	30.28	2.70	17.56	2.10	13.63
3.2	6.724	.94	6.62	44.46	4.67	31.43	2.70	18.22	2.10	14.14
3.3	6.963	.95	6.70	46.64	4.74	32.98	2.74	19.12	2.13	14.85

LIBRARY
OF THE
UNIVERSITY of ILLINOIS.

2ft. 8in. x 4ft. Sewer, continued.

Depth	Area	$\sqrt{F}$	Slope 1:250		Slope 1:500		Slope 1:1500		Slope 1:2500	
ft.	sq. ft.		v	Q	v	Q	v	Q	v	Q
3.4	7.192	.95	6.70	48.30	4.74	34.07	2.74	19.75	2.13	15.33
3.5	7.407	.95	6.70	49.62	4.74	35.09	2.74	20.34	2.13	15.79
3.6	7.607	.95	6.70	50.96	4.74	36.03	2.74	20.89	2.13	16.21
3.7	7.790	.94	6.62	51.50	4.67	36.41	2.70	21.12	2.10	16.39
3.8	7.942	.93	6.52	51.86	4.62	36.66	2.67	21.26	2.08	16.50
3.9	8.064	.92	6.44	51.94	4.55	36.73	2.63	21.29	2.04	16.52
4.0	8.132	.88	6.10	49.56	4.31	35.04	2.49	20.32	1.94	15.77

3ft. x 4ft. 6in. Sewer, Egg-shaped.

Depth	Area	$\sqrt{F}$	Slope 1:500		Slope 1:1000		Slope 1:2500	
ft.	sq. ft		v	Q	v	Q	v	Q
0.1	.051	.26	0.95	0.05	0.67	0.03	0.42	0.02
.2	.140	.35	1.37	0.19	0.99	0.13	0.61	0.08
.3	.252	.42	1.72	0.43	1.22	0.31	0.78	0.19
.4	.379	.48	2.03	0.77	1.44	0.54	0.91	0.34
.5	.520	.52	2.24	1.17	1.59	0.83	1.01	0.52
.6	.674	.56	2.46	1.66	1.74	1.17	1.11	0.75
.7	.841	.60	2.68	2.26	1.90	1.60	1.21	1.02
.8	1.020	.63	2.85	2.91	2.02	2.05	1.28	1.31
.9	1.211	.65	2.96	3.59	2.09	2.53	1.33	1.61
1.0	1.412	.68	3.13	4.42	2.21	3.12	1.40	1.99
1.1	1.623	.71	3.30	5.36	2.33	3.79	1.49	2.41
1.2	1.843	.73	3.42	8.30	2.42	4.45	1.54	2.84
1.3	2.072	.75	3.54	7.32	2.50	5.18	1.59	3.29
1.4	2.309	.77	3.65	8.43	2.58	5.96	1.64	3.79
1.5	2.554	.79	3.78	9.63	2.67	6.81	1.70	4.33
1.6	2.806	.80	3.83	10.74	2.71	7.60	1.72	4.83
1.7	3.064	.82	3.95	12.09	2.79	8.55	1.77	5.44
1.8	3.328	.84	4.06	13.53	2.88	9.56	1.83	6.08
1.9	3.597	.86	4.19	15.07	2.96	10.65	1.88	6.78
2.0	3.871	.87	4.25	16.45	3.00	11.63	1.91	7.40
2.1	4.150	.88	4.31	17.88	3.05	12.65	1.94	8.05

LIBRARY
OF THE
UNIVERSITY of ILLINOIS

3ft. x 4ft. 6in. Sewer, continued.

Depth	Area	√r	Slope 1 : 500		Slope 1 : 1000		Slope 1 : 2500	
ft.	Sq. ft.		v	Q	v	Q	v	Q
2.2	4.433	.89	4.37	19.37	3.10	13.70	1.96	8.71
2.3	4.720	.91	4.49	21.21	3.18	15.00	2.02	9.54
2.4	5.010	.92	4.55	22.82	3.22	16.14	2.04	10.27
2.5	5.303	.93	4.62	24.48	3.26	17.31	2.08	11.02
2.6	5.598	.94	4.67	26.17	3.31	18.50	2.10	11.77
2.7	5.895	.95	4.74	27.93	3.35	19.75	2.13	12.56
2.8	6.193	.95	4.74	29.34	3.35	20.74	2.13	13.20
2.9	6.492	.96	4.80	31.16	3.39	22.03	2.16	13.98
3.0	6.791	.97	4.93	33.02	3.44	23.35	2.21	14.86
3.1	7.090	.98	4.93	34.53	3.44	24.41	2.21	15.53
3.2	7.388	.99	4.99	36.83	3.52	26.04	2.24	16.57
3.3	7.683	1.00	5.05	38.79	3.57	27.43	2.27	17.45
3.4	7.974	1.00	5.05	40.26	3.57	28.47	2.27	18.12
3.5	8.259	1.00	5.05	41.70	3.57	29.49	2.27	18.77
3.6	8.537	1.00	5.05	43.10	3.57	30.48	2.27	19.40
3.7	8.807	1.01	5.11	45.03	3.62	31.84	2.30	20.26
3.8	9.066	1.01	5.11	46.36	3.62	32.78	2.30	20.86
3.9	9.312	1.01	5.11	47.61	3.62	33.67	2.30	21.42
4.0	9.544	1.01	5.11	48.80	3.62	34.51	2.30	21.96
4.1	9.763	1.01	5.11	49.92	3.62	35.30	2.30	22.46
4.2	9.953	1.00	5.05	50.25	3.57	35.53	2.27	22.61
4.3	10.117	.99	4.99	50.43	3.52	35.66	2.25	22.69
4.4	10.250	.98	4.93	50.49	3.44	35.70	2.21	22.72
4.5	10.321	.93	4.62	47.65	3.26	33.69	2.08	21.44

Multipliers for finding v and Q for other slopes, from v and Q for slope 1 : 500.

Slope 1:	Mult.	Slope 1:	Mult.	Slope 1:	Mult.	Slope 1:	Mult.	Slope 1:	Mult.	Slope 1:	Mult.
25	4.47	250	1.41	600	0.91	1100	0.67	1600	0.56	2100	0.49
50	3.16	300	1.29	700	0.85	1200	0.65	1700	0.54	2200	0.48
100	2.24	350	1.20	800	0.79	1300	0.62	1800	0.53	2300	0.47
150	1.83	400	1.12	900	0.75	1400	0.60	1900	0.51	2400	0.46
200	1.58	450	1.05	1000	0.71	1500	0.58	2000	0.50	2500	0.45

LIBRARY
OF THE
UNIVERSITY of ILLINOIS.

Note.- To obtain v and Q for Clean Water, add $\frac{1}{8}$ to the corresponding values for Sewage, as given in the foregoing tables.

Table for converting Gallons per Day into Cubic Feet per Second, and vice versâ.

Thousand Gals. to Cub. Ft.				Cubic Feet to Gallons.			
M.Gals.	Cub.ft	M.Gals.	Cub.ft.	Cub.ft.	Gallons	Cub.ft	Gallons
100	0.154	600	0.926	0.05	32,400	0.55	356,400
150	0.231	650	1.003	.10	64,800	.60	388,800
200	0.309	700	1.080	.15	97,200	.65	421,200
250	0.386	750	1.157	.20	129,600	.70	453,600
300	0.463	800	1.235	.25	162,000	.75	486,000
350	0.540	850	1.312	.30	194,400	.80	518,400
400	0.617	900	1.389	.35	226,800	.85	550,800
450	0.694	950	1.466	.40	259,200	.90	583,200
500	0.772	1000	1.543	.45	291,600	.95	615,600
550	0.849	1500	2.315	.50	324,000	1.00	648,000

The above are U.S. standard gallons.

1 U.S. standard gallon = 0.839 British imperial gallon, = 8.339 lbs. avoirdupois, = 0.134 cub.ft. 1 cub.ft. = 7.481 gals.

1 British imperial gallon = 1.199 U.S. standard gallons, = 10 lbs. avoirdupois, = 0.160 cub.ft. 1 cub.ft. = 6.232 gals.

A rainfall of 1 inch per hour = 1 cubic foot per second per acre, very nearly. The exact ratio is, 1 in. per hour = 1.0083 cub.ft. per sec. per acre.

Table for converting cub.ft. per sec. of Sewage into Population, @ 75 gals. = 10 cub. ft. per head per day.

Cub.ft	Population	Cub.ft.	Population	Cub.ft.	Population	Cub.ft.	Population
0.05	432	0.30	2592	0.55	4752	0.80	6912
.10	864	0.35	3024	.60	5184	.85	7344
.15	1296	0.40	3456	.65	5616	.90	7776
.20	1728	0.45	3888	.70	6048	.95	8208
.25	2160	0.50	4320	.75	6480	1.00	8640

LIBRARY
OF THE
UNIVERSITY of ILLINOIS.

Table of Friction Heads per 1000 feet, for various rates of discharge and sizes of pipe.

Discharge cub.ft.prsec	Discharge Gallons per day.	Diameter of pipe, ins.	Friction head, ft.	Velocity, ft. per sec
0.1	64,800	4	1.60	1.15
0.1	64,800	6	0.20	0.51
0.2	129,600	4	6.50	2.30
0.2	129,600	6	0.81	1.01
0.33	216,000	6	2.35	1.70
0.33	216,000	8	0.52	0.99
0.5	324,000	6	5.13	2.55
0.5	324,000	8	1.22	1.43
0.5	324,000	10	0.39	0.92
1.0	648,000	8	4.59	2.86
1.0	648,000	10	1.54	1.84
1.0	648,000	12	0.52	1.27
2.0	1,296,000	10	5.74	3.67
2.0	1,296,000	12	2.34	2.55
2.0	1,296,000	16	0.51	1.43
3.0	1,944,000	12	5.03	3.82
3.0	1,944,000	16	1.15	2.15
3.0	1,944,000	20	0.33	1.70
5.0	3,240,000	16	3.16	3.58
5.0	3,240,000	20	0.91	2.29
10.0	6,480,000	20	3.86	4.58
10.0	6,480,000	24	1.52	3.18
10.0	6,480,000	30	0.47	2.04
20.0	12,960,000	24	5.75	9.37
20.0	12,960,000	30	1.82	4.07
20.0	12,960,000	36	0.70	2.83
30.0	19,440,000	30	4.01	6.11
30.0	19,440,000	36	1.58	4.26
30.0	19,440,000	40	0.95	3.55

LIBRARY
OF THE
UNIVERSITY of ILLINOIS.

ITEMS OF COST OF SEWERS.

Excavation, cubic yards per 100 linear feet of trench.

Width at top	Depth of trench, feet.										
	4	6	8	10	12	14	16	18	20	22	24
3 ft.	44.4	66.7	88.9	111.1	133.3	155.5	177.8	200.0	222.2	244.4	266.6
4 "	59.3	88.9	118.5	148.1	177.8	207.4	237.0	266.6	296.3	325.9	355.5
5 "	74.1	111.1	148.1	185.2	222.2	259.3	296.3	333.3	370.4	407.4	444.4
6 "	88.9	133.3	177.8	222.2	266.6	311.1	355.6	400.0	444.4	488.9	533.3
7 "	103.7	155.6	207.4	259.3	311.1	363.0	414.8	466.7	518.5	570.4	622.2
8 "	118.5	177.8	237.0	296.3	355.5	414.8	474.1	533.3	592.6	651.9	711.1
9 "	133.3	200.0	266.6	333.3	400.0	466.7	533.3	600.0	666.7	733.3	800.0
10 "	148.2	222.2	296.3	370.4	444.4	518.5	592.6	666.6	740.8	814.8	888.9
11 "	163.0	244.4	325.9	407.4	488.9	570.4	651.9	733.3	814.8	896.3	977.8
12 "	177.8	266.6	355.5	444.4	533.3	622.2	711.1	800.0	888.9	977.8	1066.7

Cost of Handling Water, per 100 linear feet of trench.

	5 ft. deep	10 ft. deep	15 ft. deep	20 ft. deep	25 ft. deep
SLIGHTLY WET — hand pump	$6.00	$7.00	$9.50	$12.00	$18.00
QUITE WET — 1 Steam pump; 1 line 8" pipe @ 20¢ ft.; wells every 500'; moving engine &c. every 500'; rent of pump & engine, $3 per day; 1 engineer, $2.50 per day; fuel.	71.50	73.50	76.50	103.45	127.25
VERY WET — 2 steam pumps; 12" pipe @ 36¢; wells every 250' 2 engines; 3 engineers; fuel.	117.00	119.00	126.00	164.00	226.00

LIBRARY
OF THE
UNIVERSITY of ILLINOIS.

ITEMS OF COST OF SEWERS.

Paving and surfacing, per 100 linear feet of trench.

	Width of Trench.								
	3 ft.	4 ft.	5 ft.	6 ft.	7 ft.	8 ft.	9 ft.	10 ft.	11 ft.	12 ft.
Ordinary Roads	$ 3.20	$ 4.27	$ 5.33	$ 6.40	$ 7.47	$ 8.53	$ 9.60	$ 10.67	$ 11.74	$ 12.81
Macadam	4.00	5.33	6.67	8.00	9.33	10.67	12.00	13.33	14.67	16.00
Paved City Streets	15.75	21.00	26.25	31.50	36.75	42.00	47.25	52.50	57.75	63.00

17

Stay bracing, including lumber, per 100 linear feet of trench.

Width of	Depth of Trench.									
Trench	6 ft.	8 ft.	10 ft.	12 ft.	14 ft.	16 ft.	18 ft.	20 ft.	22 ft.	24 ft.
3 ft.	$ 12.86	$ 12.97	$ 13.08	$ 14.58	$ 16.38	$ 18.25	$ 25.00	$ 35.00	$ 35.05	$ 35.10
4 "	13.04	13.20	13.35	15.00	16.70	18.50	25.60	35.54	35.65	35.70
5 "	13.22	13.79	14.36	15.93	17.50	18.70	26.20	36.42	36.95	37.40
6 "	13.40	14.09	14.78	16.34	17.90	19.90	26.85	37.02	37.65	38.25
7 "	13.58	14.40	15.20	16.77	18.35	20.50	27.30	37.64	38.37	39.10
8 "	13.76	14.69	15.62	17.20	18.80	20.95	27.98	38.25	38.90	39.90
9 "	13.94	14.99	16.04	17.57	19.10	21.35	28.50	38.86	39.85	40.80
10 "	14.12	15.29	16.46	18.96	21.50	23.85	29.10	39.47	40.50	41.62
11 "	14.50	15.73	16.95	20.45	23.90	25.80	29.50	40.15	41.28	42.50
12 "	15.10	16.30	17.50	21.95	25.40	26.40	30.60	40.75	42.00	43.30

LIBRARY
OF THE
UNIVERSITY of ILLINOIS.

ITEMS OF COST OF SEWERS.

Close Sheeting, per 100 linear feet of trench.

Includes Lumber, Bracing, Driving and Plank Pulling. Lumber used four times.

Width of Trench	Depth of Trench.									
	6 ft.	8 ft.	10 ft.	12 ft.	14 ft.	16 ft.	18 ft.	20 ft.	22 ft.	24 ft.
3 ft.	$45.67	$55.65	$65.61	$74.10	$83.10	$98.10	$119.50	$146.13	$155.81	$165.50
4 "	45.80	55.80	65.82	74.75	83.40	98.60	120.25	146.53	156.23	165.95
5 "	45.93	56.10	66.20	74.95	83.75	99.10	121.05	147.19	156.79	166.50
6 "	46.06	56.35	66.60	75.35	84.12	99.60	121.85	147.85	157.40	166.95
7 "	46.19	56.60	67.00	75.95	84.50	99.90	122.40	148.51	158.01	167.50
8 "	46.32	56.86	67.40	76.50	85.00	100.25	122.75	149.17	158.77	168.40
9 "	46.45	57.12	67.80	77.10	85.52	100.60	123.40	149.83	159.80	169.75
10 "	46.58	57.40	68.20	77.55	86.05	101.15	124.10	150.49	160.25	170.75
11 "	46.75	57.75	68.75	77.95	86.60	101.65	124.80	151.25	160.80	171.85
12 "	47.10	58.20	69.30	78.20	87.10	102.25	125.50	152.00	162.60	173.20

Cost of Sewer Pipe and Laying, per foot.

Diameter of Pipe	6 in. pipe	8 in. pipe	10 in. pipe	12 in. pipe	15 in. pipe	18 in. pipe
Barrels of Cement per 100 ft. 1c.:1s.	0.17	0.29	0.45	0.66	0.91	1.20
List price of pipe per foot	30¢	45¢	70¢	80¢	$1.25	$1.60
Cost 55% off	14	20	32	36	0.56	0.72
Cost of laying, including cement, pr. ft	5	5	7	8	0.09	0.12
Total, exclusive of trench	19	25	39	44	0.65	0.84

LIBRARY
OF THE
UNIVERSITY of ILLINOIS.

ITEMS OF COST OF SEWERS.

Cost of Brick Masonry in Egg-shaped Sewers, pr. 100 lin. ft.

Dimensions of Sewer	3ft. x 2ft.	3ft. x 2ft.	3'-6" x 2'-4"	3'-6" x 2'-4"	4' x 2'-8"	4' x 2'-8"	4'-6" x 3'
Thickness	4 in.	8 in.	4 in.	8 in.	4 in.	8 in.	8 in.
Number of Bricks, @ 1 cub. ft. = 25	7,317	16,706	8,559	18,893	9,679	20,459	23,320
Bbls. Cement, 1c. : 1s.	15.45	35.27	18.07	39.89	20.44	43.19	49.15
do. 1c : 1½ s.	12.74	29.09	14.90	32.90	16.85	35.62	40.54
do. 1c. : 2 s.	10.84	24.75	12.68	27.99	14.34	30.31	34.49
Masonry, cub. yds.	10.84	24.75	12.68	27.99	14.34	30.31	34.49
Cost of masonry, @ $10 pr. c.y.	$108.40	$247.50	$126.80	$279.90	$143.40	$303.10	$344.90
do. @ $12.50 "	135.50	309.38	158.50	349.86	179.25	378.88	431.13
do. @ $15 "	162.60	371.25	190.20	419.85	215.10	454.65	517.35

MANHOLES, average about $3.50 per foot in height.
Iron covers and frames cost about $10.00 per set.
Wrought iron steps about 40 c. each.

CATCH BASINS, cost from $40 to $75 each.

LIBRARY
OF THE
UNIVERSITY OF ILLINOIS

ITEMS OF COST OF SEWERS.

Cost of Brick Masonry in Circular Sewers, per 100 linear feet.

Diameter of Sewer	24 in.	30 in.	30 in.	36 in.	36 in.	42 in.	48 in.
Thickness	4 in.	4 in.	8 in.	4 in.	8 in.	8 in.	8 in.
Number of Bricks, @ 1 cub. ft. = 25	6,102	7,418	16,578	8,741	19,196	22,167	24,428
Barrels of Cement, 1c. : 1s.	12.88	15.66	35.00	18.45	40.53	46.80	51.57
do. 1c. : 1½ s.	10.62	12.92	28.86	15.22	33.42	38.60	42.53
do. 1c. : 2s.	9.04	10.99	24.56	12.95	28.44	32.84	36.19
Masonry, cub. yds.	9.04	10.99	24.56	12.95	28.44	32.84	36.19
Cost of masonry, @ $10 per cub. yd.	$ 90.40	$ 109.90	$ 245.60	$ 129.50	$ 284.40	$ 328.40	$ 361.90
do. @ $12.50 "	113.00	137.37	307.00	161.87	355.50	410.50	452.37
do. @ $ 15 "	135.60	164.85	368.40	194.25	426.60	492.60	542.85

Diameter	54 in.	60 in.	72 in.	72 in.	84 in.	84 in.	90 in.	108 in.
Thickness	8 in.	8 in.	8 in.	12 in.	8 in.	12 in.	12 in.	12 in.
Number of Bricks	26,812	29,673	37,402	54,979	40,142	62,829	66,758	81,091
Bbls. of Cement, 1 : 1	56.82	62.65	78.96	116.1	84.75	132.6	140.1	171.1
do. 1 : 1½	46.86	51.67	65.12	95.73	69.89	109.4	116.2	141.1
do. 1 : 2	39.87	43.96	55.41	81.45	59.47	93.08	98.90	120.06
Masonry, cub. yds.	39.87	43.96	55.41	81.45	59.47	93.08	98.90	120.06
Cost, @ $10 per cub. yd.	$ 398.70	$ 439.60	$ 554.10	$ 814.50	$ 594.70	$ 930.80	$ 989.00	$ 1200.60
do. @ $12.50 "	498.37	549.50	692.62	1018.13	743.37	1163.50	1236.25	1500.75
do. @ $ 15 "	598.05	659.40	831.15	1221.75	892.05	1396.20	1483.50	1800.90

LIBRARY
OF THE
UNIVERSITY of ILLINOIS

Average cost per lin. ft. of Water Pipe, laid, in Boston.

Centre of pipe 5 feet below surface of ground. Labor, $2 per day; pipe, 1½ c. per lb.; Special castings, 3 c. per lb.; lead, 5 c. per lb.

Cost of rock excavation, $3.50 to $5.50 per cub. yd., measured to neat lines.

Diameter of pipe, ins.	Thickness, ins.	Weight, lbs.	Lead used, lbs.	Cost of pipe and specials $	Lead, gasket and blocking $	Teaming, $	Labor, trenching & laying, $	Total Cost, $
4	0.45	21.7	0.70	0.38	0.05	0.02	0.25	0.70
6	0.50	35	1.00	0.57	0.06	0.03	0.27	0.93
8	0.55	50	1.35	0.83	0.08	0.05	0.30	1.26
10	0.60	68	1.70	1.10	0.10	0.06	0.34	1.60
12	0.58-.65	78-88	2.00	1.27-1.42	0.13	0.07	0.37	1.84-1.99
16	0.66-.75	118-135	2.70	1.87-2.12	0.17	0.08	0.45	2.57-2.82
20	0.73-.85	162-198	3.35	2.55-2.84	0.21	0.09	0.55	3.40-3.79
24	0.81-.94	216-250	4.00	3.44-3.95	0.25	0.10	0.68	4.47-4.98
30	0.93	308	5.00	4.92	0.29	0.11	0.80	6.12
36	1.04	410	6.00	6.58	0.34	0.12	1.00	8.04
40	1.12	490	6.70	7.80	0.40	0.15	1.30	9.65
48	1.25	660	8.00	10.40	0.48	0.20	1.75	12.83

Average cost per cub. yd. of Rubble Masonry Side Walls.

Laid in mortar 1 cement : 2 sand.

Cement, 1 bbl. @ $1.00 – $1.50	$1.00 – $1.50
Sand, 0.30 yd. @ 0.50 – 1.25	.15 – .37
Stone,	2.00 – 2.50
Labor,	1.25 – 2.00
Total	4.40 – 6.37

LIBRARY
OF THE
UNIVERSITY of ILLINOIS.

Average cost of Concrete, per cub. yd.

Capacity of a Rosendale cement barrel :–

Between heads,	3.81 cub. ft.
Head out,	3.97 "
Head and bottom out,	4.13 "

Concrete mixed 1 : 2 : 5 contains :

1 bbl.	Cement,	=	3.81 cub. ft.
2 "	Sand (say)		8.00 "
5 "	Gravel (say)		20.00 "

This makes about 22 cub. ft. of concrete. 1 cub. yd. of concrete contains 1¼ bbls. Cement, 0.92 cub. yds. gravel, 0.37 cub. yds. sand, costing –

	Rosendale	Portland
Cement, 1¼ bbl. @ Ros $1 - $1.50	$1.25 – $1.87	$3.25 – $3.87
Port $2.60 - $3.10		
Gravel, 0.92 c.y. @ .75 – 1.50	.69 – 1.38	.69 – 1.38
Sand, 0.37 c.y. @ .50 – 1.25	.19 – .46	.19 – .46
Labor per c.y. .75 – 1.50	.75 – 1.50	.75 – 1.50
Total	2.88 – 5.21	4.88 – 7.21

RIPRAP, placed, weighs 3000 lbs. per cub. yd.
dumped, " 2500 " " " "

Average cost in Boston Harbor about $1.50 per 2000 lbs.

STONE BALLAST, weighs from 2800 to 3000 lbs. per cub. yd.

Average cost about $1.25 to $2.00 per cub. yd.

PILES, (spruce) driven, in sewer foundations, cost from $1.25 to $4.50 each, depending on length.

LUMBER, placed, in sewer foundations, costs about $25.00 per M. ft. B.M.

LIBRARY
OF THE
UNIVERSITY OF ILLINOIS

ALBERT F. HOYES.
City Engineer.

ALBERT F. NOYES,
City Engineer.

UNIVERSITY OF ILLINOIS-URBANA
628.2 M38 C001
Tables relating to sewerage /
3 0112 088639924